DESIGN DEVELOPMENT INC.

100R-4

SERVICE MANUAL

(Calibration Procedures & drawings)

DESIGN DEVELOPMENT INC.
1440 Atteberry Lane, San Jose, CA 95131
Telephone: (408) 946-6770

DESIGN DEVELOPMENT, INC.

MODEL 100R-4 CALIBRATION PROCEDURES

1) INITIAL TURN ON
2) POWER SUPPLY CHECK
3) OSCILLATOR CAL
4) RETURN LOSS TRANSMITTER CAL.
5) RECEIVER LEVEL CAL
6) RECEIVER NOISE CAL
7) RECEIVER RETURN LOSS CAL.
8) MISCELLANEOUS CIRCUIT CHECK

TEST EQUIPMENT REQUIRED:-

1) OSCILLOSCOPE
2) DVOM
3) 600 OHM ATTENUATOR-BALANCE
4) TTS MODEL 100R4
5) 1 MILLIWAT REFERENCE GENERATOR
6) AC VOLT METER-HP MODEL 403B
7) DC POWER SUPPLY
8) 600 OHM RESISTOR, 0.1%
9) 900 OHM RESISTOR, 0.1%
10) 2.16 MF CAPACITOR, 1%

1.0) SECTION 1 - INITIAL TURN ON

1.1) VISUAL INSPECTION:-INSPECT THE UNIT CAREFULLY, CHECK IF ANY COMPONENTS ARE MISSING. SOLDER BRIDGES, CAPACITORS, DIODES, AND I.C.'S ARE LOADED IN THE RIGHT MANNNER.

1.2) SET DVOM TO RESISTANCE, CHECK ALL THE TIP TRANSISTORS AND VOLTAGE REGULATORS (ON TRANSMITTER BOARD) ARE NOT SHORTED TO THE HEAT-SINK.

1.3) MID-RANGE ALL POTS.

1.4) USING THE DVOM, CHECK ACROSS CAPACITORS C608, C606, AND C604. OBSERVE THAT THERE IS NO SHORT ACROSS ANY OF THEM.

2.0) SECTION 2 - INITIAL TURN ON.

2.1) USE POWER INPUT COMMON AS REFERENCE, MONITOR THE COLLECTOR OF Q605 WITH THE SCOPE. SET THE VERTICAL GAIN TO 20V/DIV, AND HORIZONTAL SWEEP TO 10 MS/DIV.

2.2) ADJUST DC POWER SUPPLY TO -48 VOLTS, AND CONNECT IT TO THE POWER INPUT OF THE UNIT UNDER TEST.

2.3) TURN POWER ON. OBSERVE THAT A CLEAN SQUARE WAVE OF 80 VOLTS PEAK TO PEAK APPEAR ON THE SCREEN, AND THE FREQUENCY IS AROUND 20K HZ. CHECK THE INPUT CURRENT SHOULD BE AROUND 280 MILLIAMPS. ADJUST THE VALUE OF R604, AND/OR R603 IF NECESSARY.

2.4) SET DVOM TO DC VOLTS, AND MONITOR ACROSS C608, CHECK THE VOLTAGE SHOULD READ -15V +/-.3V.

2.5) MONITOR ACROSS C606, THE VOLTAGE SHOULD READ +15V +/.3V.

2.6) MONITOR ACROSS C604, THE VOLTAGE SHOULD READ +5V +/-.2V.

3.0) SECTION 3 - OSCILLATOR CALIBRATION

3.1) PATCH THE 100R4 SEND TO THE TTS 100R4 RECEIVE AND SELECT SETTING AS FOLLOWS:

100R4 TRANSMITTER SWITCH
- a) NORM
- b) 600 OHM
- c) VAR-OSC LEVEL, AND
- d) VAR-OSC FREQUENCY (100HZ TO 4KHZ)

100R4 RECEIVER SWITCH
- a) 600 OHM
- b) TERM
- c) LEVEL

3.2) TURN POWER TO ON IN BOTH UNITS, AND ADJUST VAR FREQUENCY CONTROL IN THE FRONT PANEL ALL THE WAY COUNTER CLOCKWISE, ADJUST R352 TO READ 90 HZ ON THE TTS 100R4.

3.3) TURN THE VAR FREQUENCY CONTROL ALL THE WAY CLOCKWISE, THE FREQUENCY SHOULD READ ABOVE 4KHZ.

3.4) SELECT 404 ON THE 100R4, AND ADJUST R355 TO READ 404.

3.5) SELECT 1004 ON THE 100R4, AND ADJUST R357 TO READ 1004.

3.6) SELECT 2804 ON THE 100R4, AND ADJUST R358 TO READ 2804.

3.7) SELECT 1004, AND ADJUST VAR LEVEL SO THE METER READS 0.0 DBM. SELECT DBRN, C-MSG AND 1010 NOTCH FILTER ON THE 100R4, ADJUST R360 AND R359 TO READ BELOW +30 DBRN. CHECK 3KHZ AND 15KHZ TO READ BELOW 35 DBRN.

3.8) RECHECK STEPS 3.3 TO 3.6.

3.9) SELECT 1004 ON THE 100R4, AND ADJUST VAR LEVEL ALL THE WAY CLOCKWISE. ADJUST R391 TO READ 10.3 DBM. ADJUST VAR LEVEL ALL THE WAY COUNTERCLOCKWISE, THE LEVEL SHOULD READ BELOW -40.2 DBM.

3.10) SELECT 0 DBM, AND ADJUST R368 TO READ 0.0 DBM.

3.11) CHANGE FREQ TO VAR, AND 1004 HZ, ADJUST R375 TO READ 0.0 DBM ON THE METER.

3.12) SELECT -16 DBM, AND ADJUST R369 TO READ -16.0 DBM.

3.13) CHANGE LEVEL TO VAR, ADJUST IT TO READ 0.0., CHANGE VAR FREQ SETTING TO 4 KHZ TO 20 KHZ, ADJUST VAR FREQ CONTROL ALL THE WAY COUNTERCLOCKWISE, THE FREQUENCY SHOULD READ BELOW 4 KHZ, AND ALL THE WAY CLOCKWISE, THE FREQUENCY SHOULD READ ABOVE 22 KHZ. OBSERVE THAT THE LEVEL SHOULD NOT CHANGE MORE THAN 0.2 DBM, AND REPEAT THE STEP WITH THE VAR LEVEL SET AT +9.0 DBM, THE LEVEL SHOULD NOT CHANGE MORE THAN 0.2 DBM.

3.14) SELECT 0 DBM AND 1004, AND CHANGE TO 900 OHM ON BOTH 100R4 AND TTS 100R4 ADJUST R392 TO READ 0.0 DBM ON THE METER.

4.0) SECTION 4 - RETURN LOSS TRANSMITTER CAL.

4.1) LIFT UP THE + SIDE OF C301, USING A JUMPER AND CONNECT IT TO PIN 6 OF U310. SET UP THE EQUIPMENTS AS FOLLOWS:-

100R4 TRANSMITTER
- a) 600 OHM
- b) VAR LEVEL, AND
- c) VAR FREQ

100R4 RECEIVER
- a) 600 OHM
- b) TERM
- c) LEVEL

4.2) TURN POWER ON AND SELECT 4W, ERL, AND RL ON THE 100R4 RECEIVER. ADJUST VAR LEVEL AND FREQ TO READ 0.0 DBM AND 100 HZ, CHECK THE READING AGAINST THE TABLE BELOW:-

FREQ	READING	TOLERANCE
200	>-30	XXXXXXXXX
300	-21.8	+/-2.3
560	-3	0.6
750	-0.2	0.3
1000	0	0.1
1500	-0.1	0.3
1965	-3	0.6
2400	-10.9	1.2
3000	-22.9	3.0
4000	-42.6	5.0
>5000	>-45	XXXXXXXXX

4.3) SELECT SRL-LO, SET FREQ AND LEVEL TO READ 0.0 DBM AND 360 HZ, CHECK FILTER RESPONSE AGAINST THE TABLE BELOW:-

FREQ	LOSS	TOLERANCE
<100	>20	XXXXXXXXX
120	-20	XXXXXXXXX
200	-9.5	+/-1.1
260	-3	0.5
360	0	0.2
500	-3	0.5
650	-10	1.2
1000	-20	XXXXXXXXX
>1200	>20	XXXXXXXXX

4.4) SELECT SRL-HI, SET FREQ AND LEVEL TO READ 0.0 DBM AND 2750 HZ, CHECK FILTER RESPONSE AGAINST THE TABLE BELOW:-

FREQ		LOSS	TOLERANCE
>1000		>30	XXXXXXXXX
1300		-30	XXXXXXXXX
2000		-11.5	+/-1.3
2200		-3	0.5
2750		0	0.00
3400	*	-3	0.5
3700		-10.9	1.3
5700		-30	XXXXXXXXX
>6000		>30	XXXXXXXXX

*ADJUST R317 TO READ -3.0 DB

4.5) TURN OFF POWER AND SOLDER C301 BACK TO THE PC BOARD. PATCH THE 100R4SEND OUTPUT TO THE HP403 AC VOLTMETER, TERMINATE THE VOLTMETER WITH A 600 OHM, 1% RESISTOR. SELECT ERL FILTER, AND ADJUST R301 TO READ -2.0 DBM.

4.6) SELECT SRL-HI FILTER AND ADJUST R327 TO READ -2.0 DBM.

4.7) SELECT SRL-LO FILTER AND ADJUST R311 TO READ -2.0 DBM.

5.0) SECTION 5 - RECEIVER CALIBRATION-LEVEL

5.1) PATCH 100R4 RECEIVE TO 100R4 SEND, AND SETUP THE EQUIPMENTS AS FOLLOWS:-

100R4 RECEIVER
- a) 600 OHM
- b) TERM
- c) LEVEL, AND
- d) L/N

100R4 SEND
- a) 600 OHM
- b) 1004, AND
- c) VAR LEVEL

5.2) MONITOR ACROSS C31 WITH THE DVOM AND SET IT TO READ DCV. INCREASE THE 100R4 LEVEL OUTPUT TO APPROXIMATELY +3.5 DBM SO THAT THE DVOM READS 4.000 VOLTS. INTRODUCE 12 DB OF ATTENUATION, AND ADJUST R67 TO READ 1.004 VOLTS. REPEAT THE ABOVE STEP FOR PROPER TRACKING.

5.3) INCREASE LEVEL SO THE 100R4 DISPLAYS +4.0 DBM, INTRODUCE 13 DB OF ATTENUATION, ADJUST R81 TO READ +9.0. REPEAT THE PROCESS FOR PROPER TRACKING. CHECK TRACKING ALL THE WAY TO -50.0, OBSERVE THAT THE DISPLAY WILL BLANK BELOW -50.0 DBM EXCEPT THE MINUS SIGN, AND WILL BLANK ABOVE +15.0 DBM EXCEPT THE PLUS SIGN.

5.4) PATCH THE REFERENCE GENERATOR (600 OHM) TO THE RECEIVE INPUT OF THE 100R4, ADJUST R7 TO READ 0.0. SWITCH BOTH 100R4 AND REFERENCE GENERATOR TO 900 OHM, AND ADJUST R8 TO READ 0.0 DBM.

5.5) PATCH THE 100R4 SEND TO THE 100R4 RECEIVE INPUT, AND ADJUST 100R4 TO SEND 0.0 DBM AT 1004 HZ TO THE 100R4, SLOWLY SWEEP THE SEND FREQUENCY FROM 100 HZ TO 20 KHZ, CHECK THAT THE 100R4 SHOULD READ WITHIN +/-0.2 DB.
*SELECT A CAPACITOR ACROSS R33 OR R34 IF NECESSARY.

5.6) SET THE METER TO READ 0.0 DBM, AND 1004. SELECT BP (0.2-5 KHZ), ADJUST R248 TO READ 0.0. CHECK THE -3DB POINT AT 200 HZ AND 5 KHZ.

5.7) SLOWLY SWEEP THE FREQUENCY TO 10 KHZ, OBSERVE THE FREQUENCY DECIMAL WILL CHANGE TO 10 HZ RESOLUTION AS THE FREQUENCY EXCEED 10 KHZ. SLOWLY DECREASE THE SEND FREQUENCY, OBSERVE THAT THE DECIMAL WILL CHANGE BACK TO 1 HZ RESOLUTION BELOW 9.000 KHZ.

6.0) SECTION 6 - RECEIVER NOISE CALIBRATION.

6.1) PATCH THE 100R4 SEND TO THE 100R4 RECEIVE INPUT. AND SETUP EQUIPMENTS AS FOLLOWS:-

100R4 SEND
- a) 600 OHM
- b) VAR LEVEL, AND
- c) VAR FREQ

100R4 RECEIVE
- a) 600 OHM
- b) TERM, AND
- c) C-MSG FILTER

6.2) SET 100R4 SEND TO -0.4, AND 1004 HZ. ADJUST R35 SO THE READING OF THE METER JUST CHANGE FROM +89 TO +90 DBRN. SET LEVEL TO 0.0 DBM, AND CHECK THE FILTER FREQUENCY RESPONSE AGAINST THE TABLE BELOW:-

FREQ	READING	TOLERANCE
200	+65	+/-2
400	+79	1
700	+87	1
1000	+90	0
1500	+89	1
2800	+88	1
3500	+82	2
5000	+61	3

6.3) SELECT 3KHZ FILTER, AND 15 KHZ FILTER AND CHECK THEM AGAINST THE TABLE BELOW:-

3KHZ FILTER

FREQ	READING	TOLERANCE
400	+90	+/-1
1000	+90	0
3000	+87	1

15KHZ FILTER

FREQ	READING	TOLERANCE
400	+90	+/-1
1000	+90	0
3000	+90	1
15000	+87	1

6.4) SET FREQUENCY TO 1004, AND SELECT C-MSG FILTER, CHECK TRACKING TO 0 DBRN, ADJUST R23 IF NECESSARY TO READ PROPER WHEN BELOW +10 DBRN. CHECK TO SEE THAT WHEN BELOW +0 DBRN THE DISPLAY WILL BLANK EXCEPT THE MINUS SIGN, AND WHEN ABOVE +95, THE DISPLAY WILL BLANK EXCEPT THE PLUS SIGN

6.5) SET UP THE EQUIPMENT AS FOLLOWS:-

100R4 SEND
- a) 600 OHM
- b) 0 DBM, AND
- c) 1004

100R4 RECEIVE
- a) 600 OHM
- b) TERM
- c) 3KHZ FILTER, AND
- d) NOTCH

6.6) ADJUST R217 AND R228 TO OBTAIN THE LOWEST READING (BELOW +30 DBRN). CHANGE FREQUENCY TO 404 HZ, ADJUST R211 TO READ +90 DBRN.

6.7) INCREASE FREQUENCY TO 862 HZ, ADJUST R205 TO READ +87 OR +88 DBRN.

6.8) INCREASE FREQUENCY TO 1182 HZ, ADJUST R239 TO READ +87 OR +88 DBRN.REPEAT STEPS 6.7 AND 6.8 FOR PROPER READINGS.

6.9) CONNECT THE TIP OUTPUT OF THE 100R4 SEND TO PIN 8 OF THE TS-1 CONNECTOR OF THE 100R4, AND THE RING OUTPUT TO BOTH THE TIP AND RING RECEIVE INPUT OF THE 100R4. ADJUST SEND LEVEL TO 0.0 DBM AND 1004 HZ, SELECT C-MSG AND NOISE N/G (NO 1010 HZ NOTCH FILTER). THE METER SHOULD READ +90. DECREASE LEVEL TO -40 DBM, THE METER SHOULD READ +50. INCREASE THE LEVEL TO +15 DBM, THE METER SHOULD READ +105.

6.10) USE A JUMPER, SHORT PIN 11 OF U28 TO GROUND. CHECK THAT THE FREQUENCY READOUT WILL DISPLAY THE PROPER FREQUENCY.

7.0) SECTION 7 - RECEIVER RETURN LOSS CALIBRATION

7.1) SETUP 100R4 AS FOLLOWS:-

- a) 900 OHM,
- b) 2W,
- c) ERL
- d) INT NET, AND
- e) RL

MONITOR PIN 6 OF U15 WITH THE SCOPE, AND CONNECT A 900 OHM, 0.1% RESISTOR, AND A 2.16 MF CAPACITOR IN SERIES ACROSS THE OUTPUT OF THE SEND. ADJUST THE RESISTOR R507 TO OBTAIN THE LOWEST READING ON THE SCOPE.

7.2) SWITCH TO 600 OHM, AND REMOVE THE RESISTOR/CAPACITOR NETWORK. ADJUST R41 SO THE METER JUST STARTS TO CHANGE FROM -0 TO +0. SHORT THE SEND OUTPUT WITH A JUMPER THE METER SHOULD STILL READ 0.

7.3) SWITCH BACK TO 900 OHM, AND CONNECT A 900 OHM, 0.1% RESISTOR ACROSS THE SEND OUTPUT. THE METER SHOULD READ +28.3 ± 0.4 DB. SWITCH TO SRL-LO, THE METER SHOULD READ +18.9 ± 0.4 DB. SWITCH TO SRL-HI, THE METER SHOULD READ +36.6 ± 0.4 DB.

7.4) PATCH THE SEND AND THE RECEIVE TOGETHER THRU AN ATTENUATOR. SELECT 4W, ERL AND MAKE SURE THE THL CORRECTION IS SET TO 00.0 ADJUST R44 TO READ +/-0.

7.5) USE THE ATTENUATOR, CHECK TRACKING TO +50 DB. SET THL CORRECTION TO 10.0, CHECK THE READING TO BE +40. REPEAT THAT PROCESS FOR THE 1 DB AND 0.1 DB DIGIT, CHECK THEM FOR PROPER OPERATION, WITH THE THL CORRECTION SET AT 29.9 THE DISPLAY SHOULD READ +20. INCRASE THE ATTENUATOR SETTING TO ANOTHER 30 DB, THE METER SHOULD NOW READ +50. THE SET WILL BLANK AT +51.

7.6) RESET ALL BACK TO 0. SELECT -16/+7 SWITCH, CHECK THE METER TO READ +23.0 DB ± 0.2 DB.

8.0) SECTION 8 - MISCELLANEOUS CIRCUIT CHECKS.

8.1) SELECT 600 OHM, 0 DBM, AND 1004 ON THE SEND, AND 600 OHM, TERM, AND LEVEL ON THE RECEIVE SELECT DISP, AND ADJUST R395 (TRANSMITTER BOARD) TO READ 0.0.

8.2) SELECT RL, 4W AND ADJUST R398 TO READ 0. SWITCH TO OSC AND ADJUST R386 TO READ 0.

8.3) SELECT NORM/XFR SWITCH, CHECK NOW THE SEND BECOMES REC, AND THE REC BECOMES SEND.

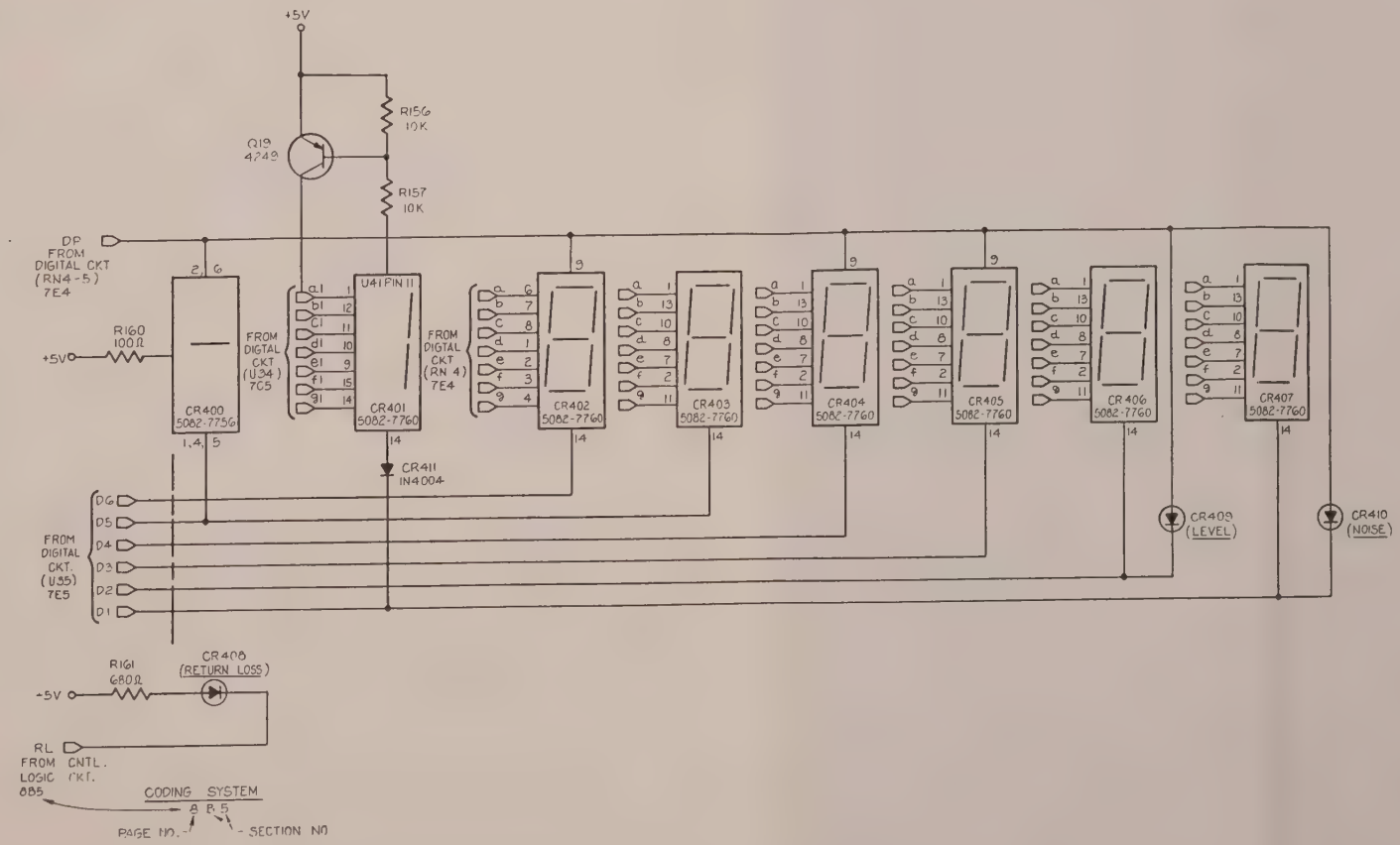
8.4) SET THE DVOM TO MILLIAMP DC, AND CONNECT IT IN SERIES WITH THE 600 OHM RESISTOR, SEND OUTPUT AND THE -48 VOLT POWER SUPPLY. SELECT HOLD SWITCH, OBSERVE THE DVOM SHOULD READ AROUND 25 MA. REPEAT THE SAME STEP FOR THE RECEIVE INPUT.

8.5) SELECT S/R DIAL. USING THE DVOM, CHECK THAT THE RECEIVE TIP AND RING SHOULD CONNECT TO THE TIP AND RING OF THE DIAL OUTPUT.

8.6) CONNECT 100A-3 TO PINS 6 AND 7 OF TS-1 CONNECTOR, CHECK THE SERIAL DISPLAY FOR PROPER OPERATION. ALSO CHECK POSITION SERVE STRAPPING OPTION.

8.7) SEAL ALL POTS.

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED



NOTE:

1. ALL CONNECTORS TO PAGE 7.

TOLERANCES UNLESS OTHERWISE SPECIFIED		
FRACTIONS	DEC	ANGLES
±	±	±

APPROVALS	DATE
DRAWN DJS	4-22-86
CHECKED	
ISSUE	

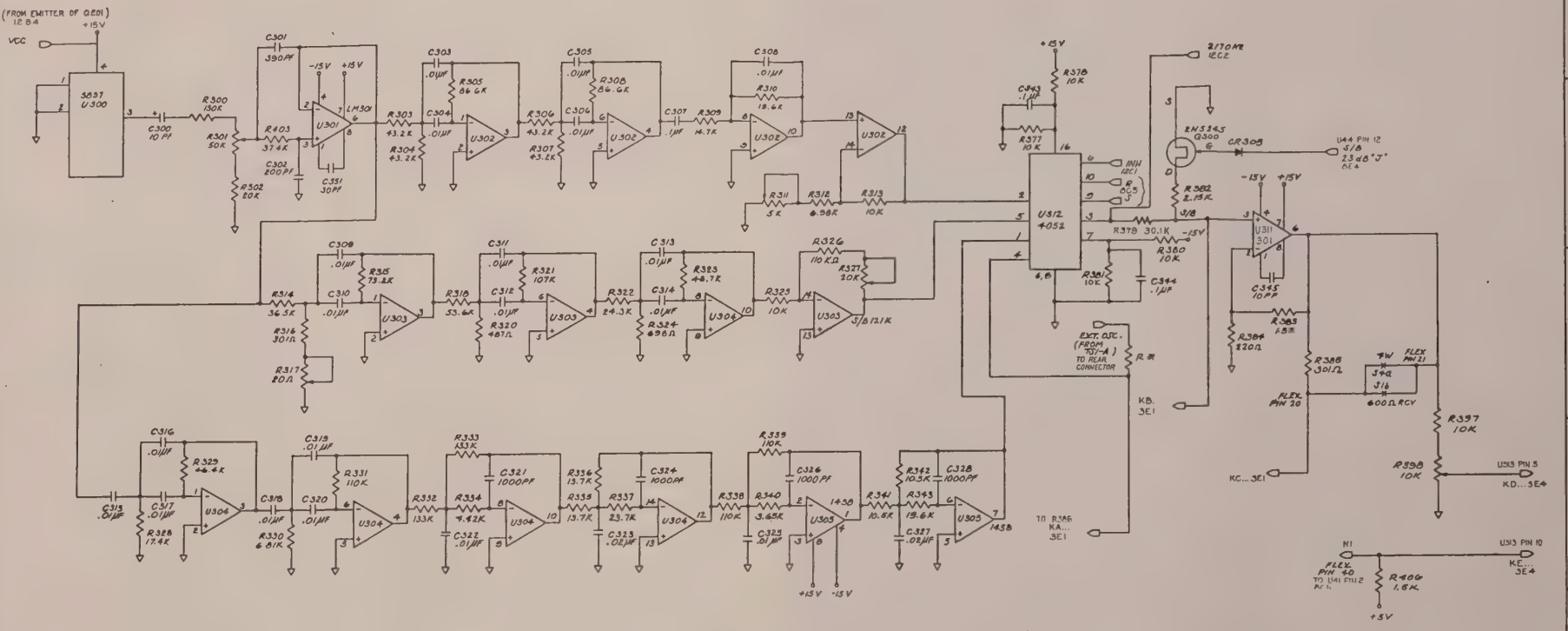
ddi DESIGN DEVELOPMENT, INC.
1440 ATTEBURY LANE · SAN JOSE, CA 95131 (408) 946-6770

SCHEMATIC DRAWING
100R-4 DISPLAY CKT.

SCALE	SIZE	DRAWING NO.
NONE	C	80-6740 -1011

DO NOT SCALE DRAWING — SHEET 1 OF 13

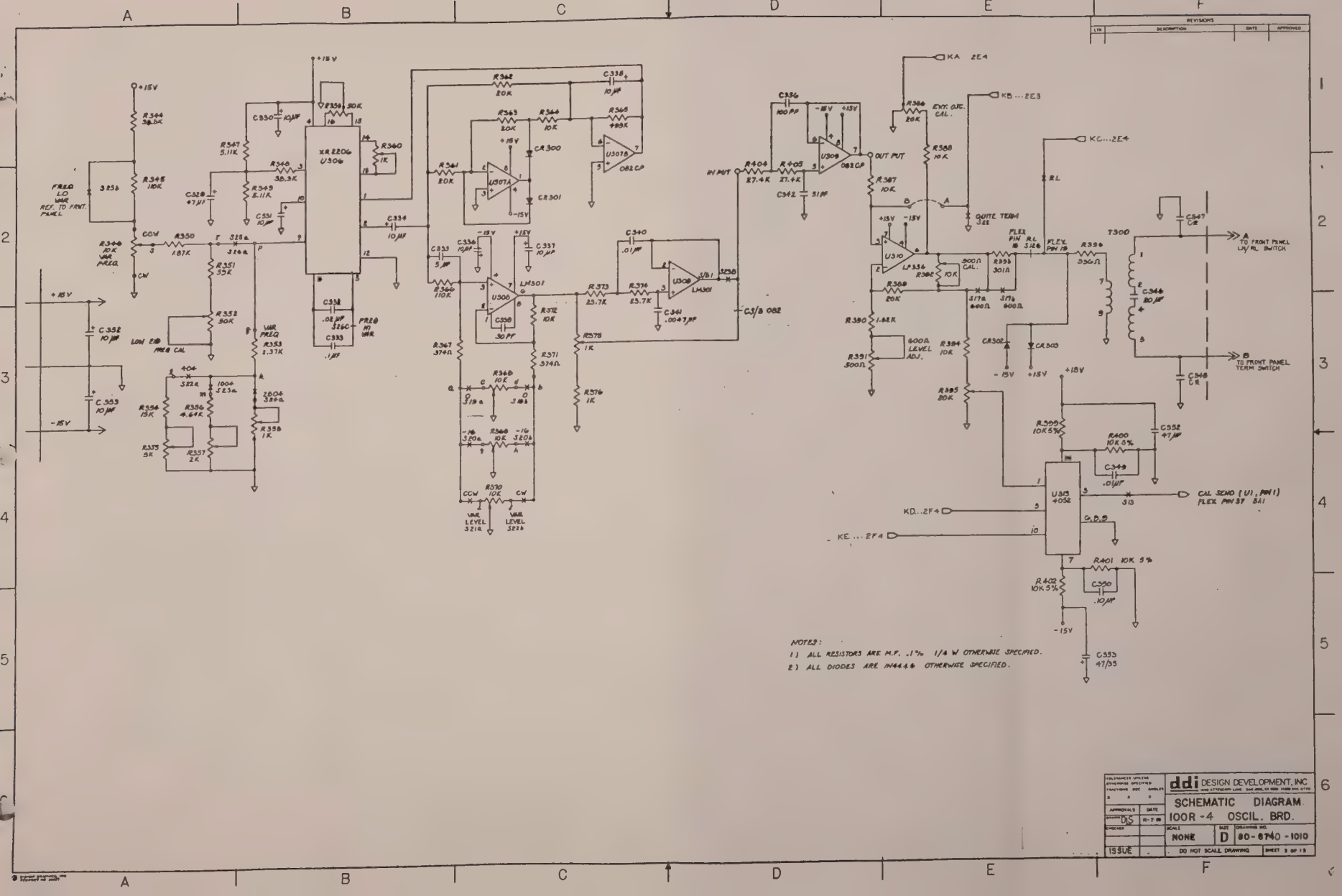
BISHOP GRAPHICS INC REFERENCE NO. 70527

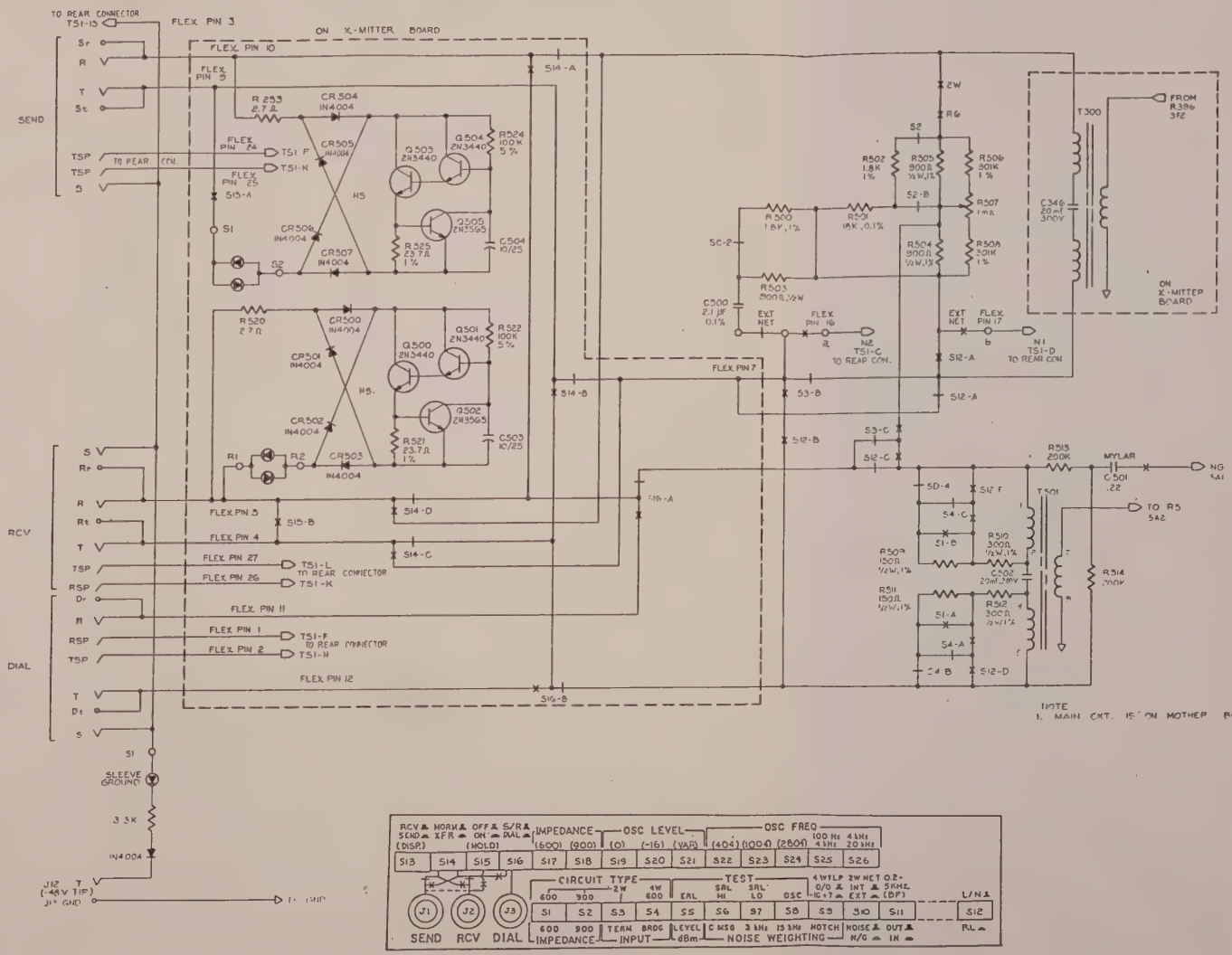


NOTES:
1) ALL RESISTORS ARE M.F. 1% 1/4W OTHERWISE SPECIFIED.
2) ALL DIODES ARE IN4446 OTHERWISE SPECIFIED.
3) U302, U303, AND U305 ARE XR4136 P.C.

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED

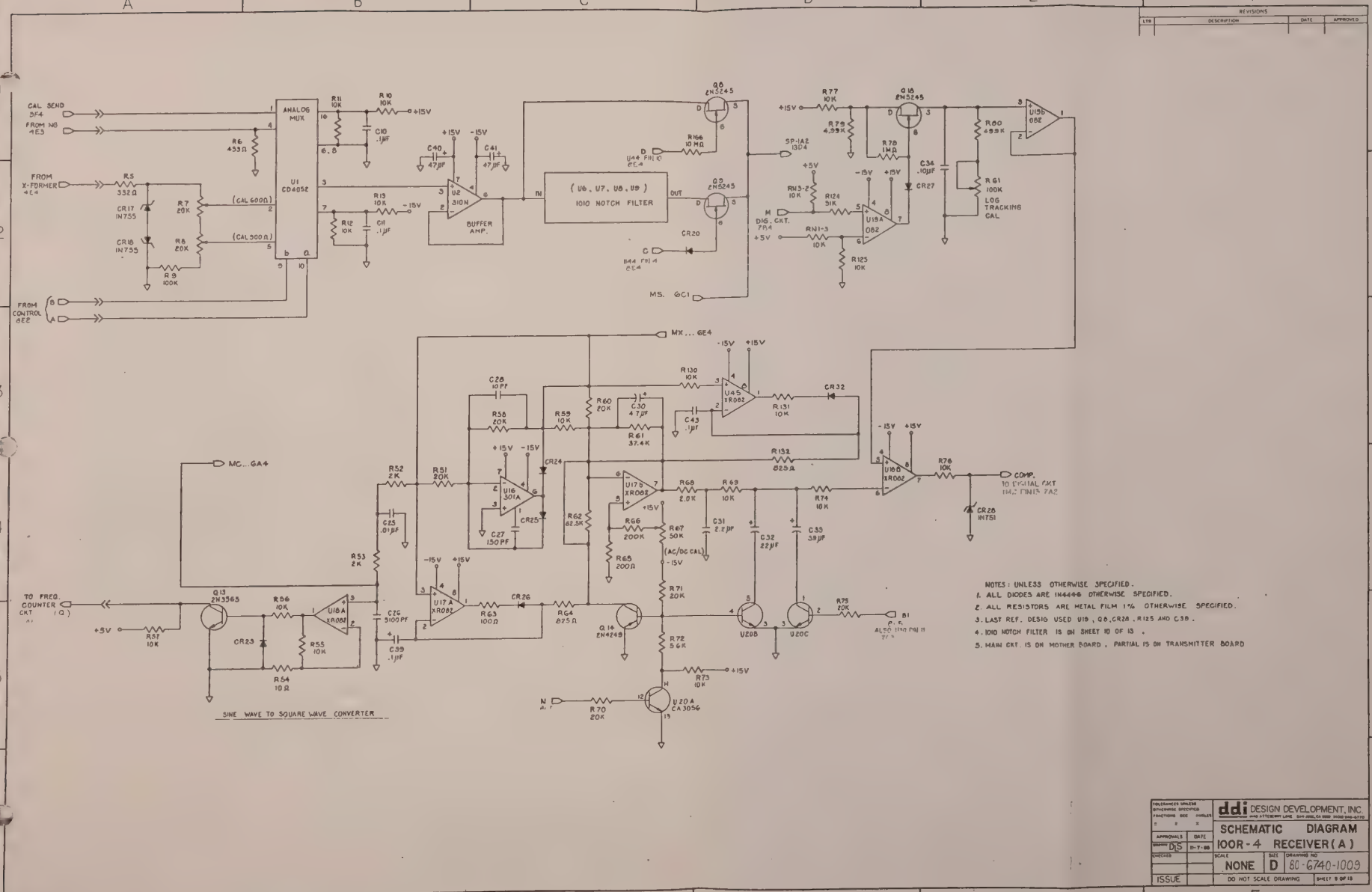
TOLERANCES UNLESS OTHERWISE SPECIFIED FRACTIONS DEC ANGLES	ddi DESIGN DEVELOPMENT, INC		
APPROVALS	DATE	SCHEMATIC DIAGRAM	
DRAWN DS	10-7-83	100R-4 RETURN E LOSS	
CHECKED		SCALE NONE	SIZE D DRAWING NO 80-6740-1010
ISSUE		DO NOT SCALE DRAWING	SHEET 2 OF 15


REVISIONS
LTR DESCRIPTION DATE APPROVED
FREQ LO VARI REF. TO FRNT. PANEL
R344 36.5K
R345 10K
R346 10K VAR FREQ
R347 5.11K
R348 38.3K
R349 5.11K
R350 187K
R351 35K
R352 80K
R353 1.37K
VAR FREQ
LOW END FREQ CAL
R354 15K
R355 5K
R356 4.64K
R357 2K
R358 1K
C328 47µF
C329 10µF
C330 .02µF
C331 10µF
C332 10µF
C333 .1µF
C334 10µF
C335 .02µF
C336 100PF
C337 10µF
C338 10µF
C339 .01µF
C340 .01µF
C341 .0047µF
C342 51PF
C343 .05/8.082
C346 80µF
C347 C/R
C348 C/R
C349 .01µF
C350 30PF
C351 10µF
C352 10µF
C353 10µF
C390 .10µF
C393 47/35
XR 2206 U306
U307A
U307B 082CP
U308 LM301
U309 082CP
U310 LF356
LM301
R360 1K
R361 20K
R362 20K
R363 20K
R364 10K
R365 499K
R366 110K
R367 374Ω
R368 10K
R369 20K
R370 10K
R371 374Ω
R372 10K
R373 25.7K
R374 25.7K
R376 1K
R378 1K
R380 1.82K
R381 600Ω LEVEL ADJ.
R382 10K
R383 20K
R384 10K
R385 20K
R386 20K
R387 10K
R388 20K
R389 300Ω
R390 10K 5%
R391 300Ω
R392 10K
R393 301Ω
R394 336Ω
R395 10K 5%
R400 10K 5%
R401 10K 5%
R402 10K 5%
R404 27.4K
R405 27.4K
U803 4052
T300
CR300
CR301
CR302
CR303
KA 2E4
KB ...2E3
KC...2E4
KD...2F4
KE ...2F4
RL
OUT PUT
IN PUT
EXT. OUT. CAL.
QUITE TERM 3E2
FLEX PIN 18 3126
FLEX PIN 19
500Ω CAL.
600Ω
A TO FRONT PANEL LAY RL SWITCH
B TO FRONT PANEL TERM SWITCH
CAL SCHD (U1, PIN 1) FLEX PIN 37 8A1
NOTES:
1) ALL RESISTORS ARE M.F. .1% 1/4 W OTHERWISE SPECIFIED.
2) ALL DIODES ARE IN4446 OTHERWISE SPECIFIED.
ddi DESIGN DEVELOPMENT, INC.
SCHEMATIC DIAGRAM
100R-4 OSCIL. BRD.
SCALE NONE
SIZE D
DRAWING NO. 80-6740-1010
DO NOT SCALE DRAWING
SHEET 3 OF 13
ISSUE


TO REAR CONNECTOR TS1-15
FLEX PIN 3
ON X-MITTER BOARD
FLEX PIN 10
SEND
RCV
DIAL
TO REAR CON.
HS
FROM R396 3Y2
T300
ON X-MITTER BOARD
C346 20 mf 300V
EXT NET
FLEX PIN 16
EXT NET
FLEX PIN 17
TS1-C TO REAR CON.
TS1-D TO REAR CON
FLEX PIN 7
MYLAR
C501 .22
TO R5 5A2
T501
FLEX PIN 5
FLEX PIN 4
FLEX PIN 27
TS1-L TO REAR CONNECTOR
FLEX PIN 26
TS1-K
FLEX PIN 11
FLEX PIN 1
TS1-F TO REAR CONNECTOR
FLEX PIN 2
TS1-H
FLEX PIN 12
SLEEVE GROUND
3.3K
IN4004
J12 T (-48V TIP)
J13 GND
NOTE
1. MAIN CKT. IS ON MOTHER BOARD. PARTIAL IS ON X-MITTER BOARD.
RCV NORM OFF S/R
SEND XFR ON DIAL
(DISP.) (HOLD)
IMPEDANCE (600) (900)
OSC LEVEL (0) (-16) (VAR)
OSC FREQ (404) (1004) (2804) 100 Hz 4 kHz 1 kHz 20 kHz
S13 S14 S15 S16 S17 S18 S19 S20 S21 S22 S23 S24 S25 S26
CIRCUIT TYPE 600 900 2W 4W 600
TEST EAL SAL HI SAL LO OSC
4 W TLP 0/0 2W NET 0.2-16+7 INT 5 KHz EXT (DP)
S1 S2 S3 S4 S5 S6 S7 S8 S9 S10 S11 L/N S12
600 900 IMPEDANCE TERM BRDG INPUT LEVEL dBm C MSG 3 kHz 15 kHz NOISE WEIGHTING NOTCH NOISE N/G OUT 1K RL
J1 J2 J3
SEND RCV DIAL
FRONT PANEL SWITCHING

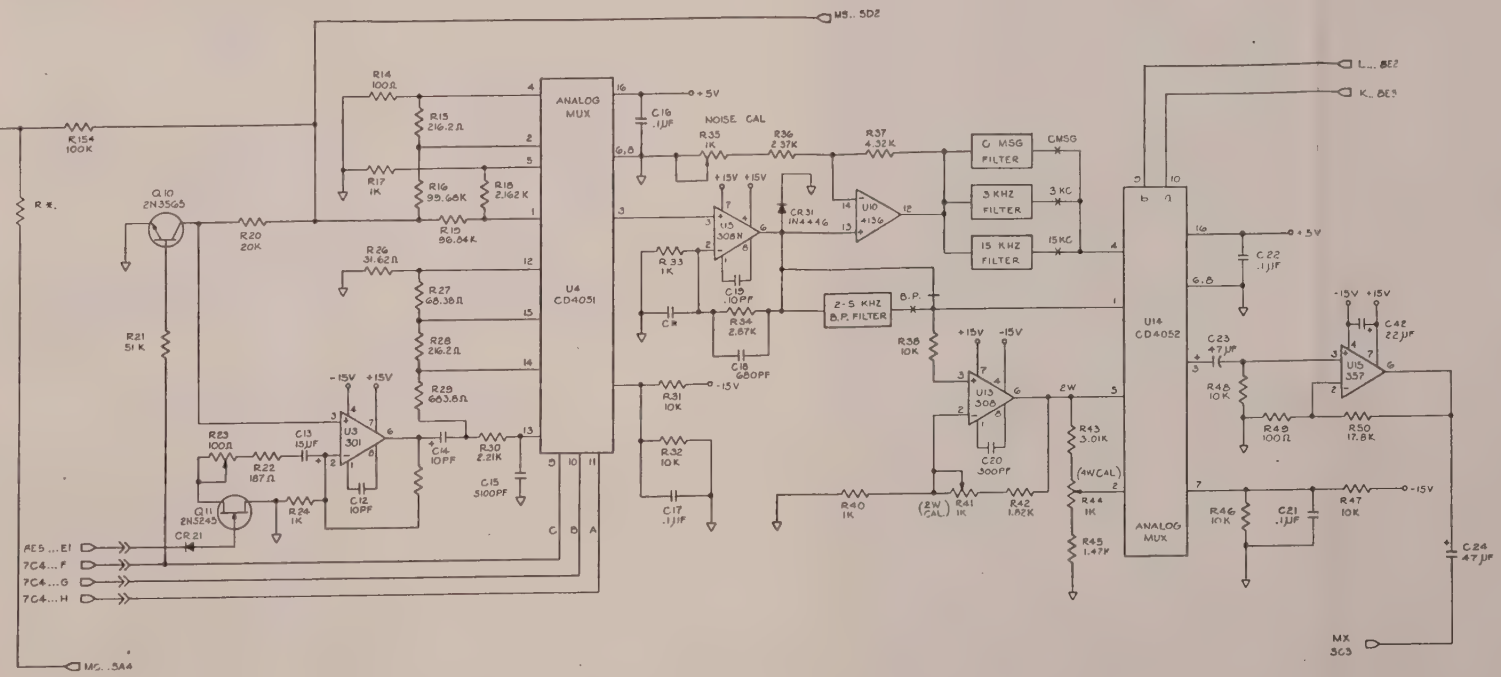
REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED

TOLERANCES UNLESS OTHERWISE SPECIFIED FRACTIONS DEC ANGLES		ddi DESIGN DEVELOPMENT, INC.	
APPROVALS	DATE	SCHEMATIC DIAGRAM 100R-4 FRONT SWITCH CK.	
DRAWN DS	8-3-88		
CHECKED		SCALE NONE	SIZE D DRAWING NO. 80-6740-1009
ISSUE		DO NOT SCALE DRAWING	SHEET 4 OF 13


CAL SEND
FROM MB
FROM X-FORMER
FROM CONTROL
ANALOG MUX
U1 CD4052
(CAL 600Ω)
(CAL 300Ω)
CR17 IN755
CR18 IN755
BUFFER AMP.
(U6, U7, U8, U9)
1010 NOTCH FILTER
MS. GC1
MX... GE4
MC... GA4
SINE WAVE TO SQUARE WAVE CONVERTER
TO FREQ. COUNTER CKT
COMP. TO DIGITAL CKT
LOG TRACKING CAL
NOTES: UNLESS OTHERWISE SPECIFIED.
1. ALL DIODES ARE IN4446 OTHERWISE SPECIFIED.
2. ALL RESISTORS ARE METAL FILM 1% OTHERWISE SPECIFIED.
3. LAST REF. DESIG USED U19, Q8, CR28, R125 AND C38.
4. 1010 NOTCH FILTER IS ON SHEET 10 OF 13.
5. MAIN CKT. IS ON MOTHER BOARD. PARTIAL IS ON TRANSMITTER BOARD

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED

TOLERANCES UNLESS OTHERWISE SPECIFIED: FRACTIONS DEC ANGLES	ddi DESIGN DEVELOPMENT, INC. 1440 JETTY LANE SAN JOSE, CA 95120 (408) 268-6770
APPROVALS / DATE	SCHEMATIC DIAGRAM
DRAWN DJS 11-7-88	100R-4 RECEIVER (A)
CHECKED	SCALE NONE / SIZE D / DRAWING NO 80-6740-1009
ISSUE	DO NOT SCALE DRAWING / SHEET 9 OF 13

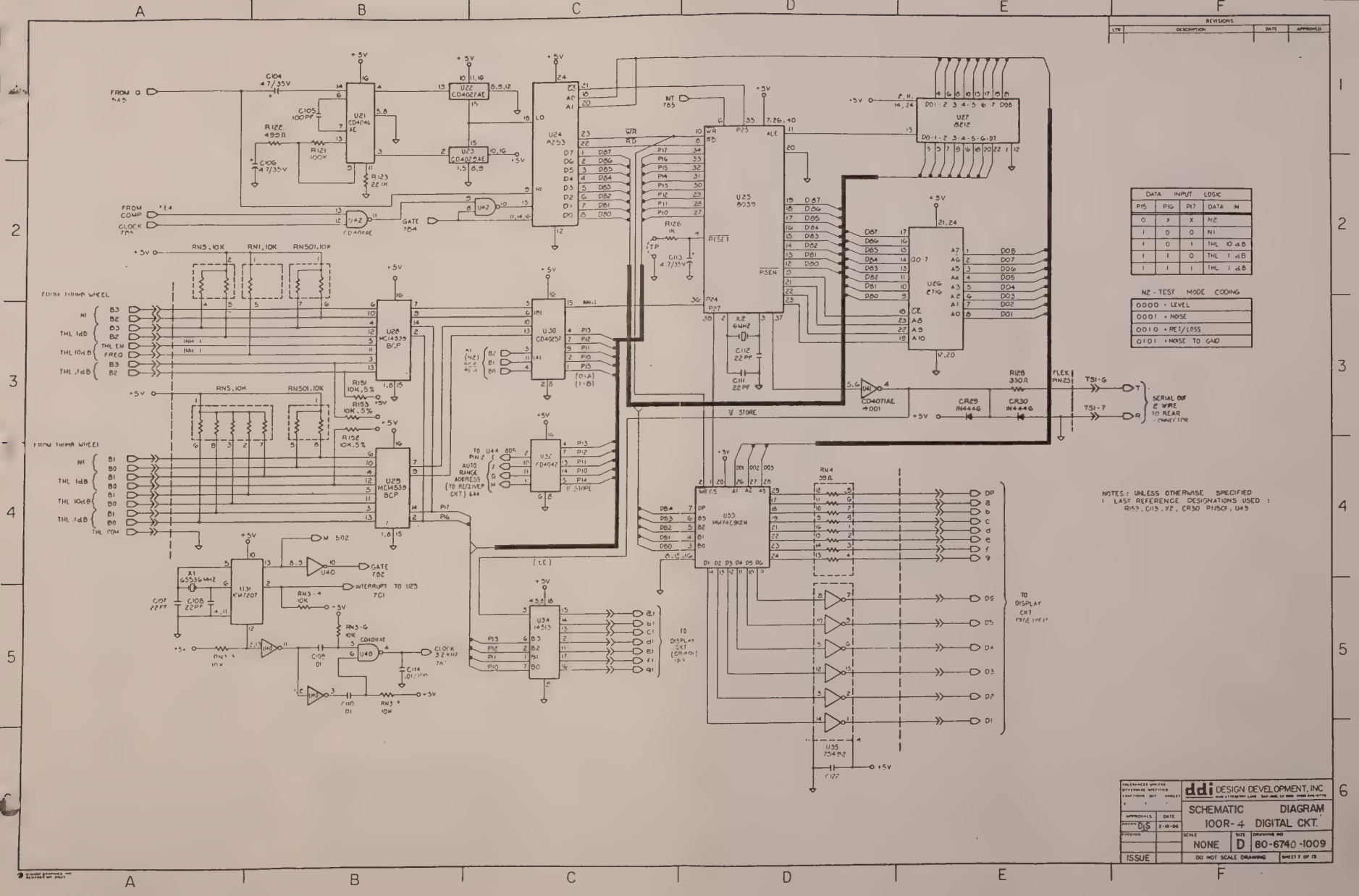


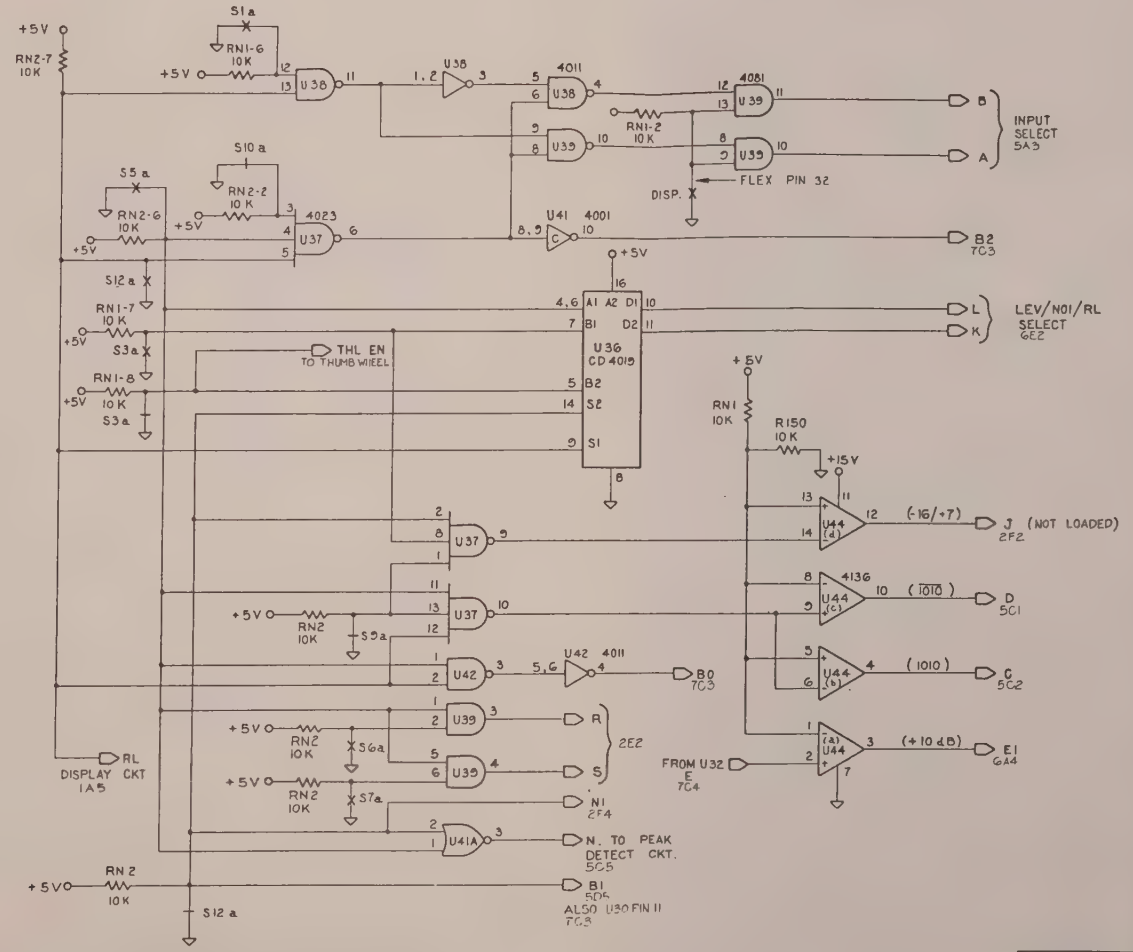
NOTES

1. ALL DIODES ARE IN4446 OTHERWISE SPECIFIED.
2. ALL RESISTORS ARE METAL FILM 1% OTHERWISE SPECIFIED.
3. LAST REF. DESIG. USED U5, Q8, CR28, R125, AND C35.
4. CMSG FILTER, 3 KHZ LAT FILTER, 15KHZ LAT FILTER CKT. ARE ON SHEET 9 OF 13.
5. .2-3 KHZ B.P. FILTER CKT IS ON SHEET OF .
6. MAIN CKT. IS ON MOTHER BOARD. PARTIAL IS ON TRANSMITTER BOARD.

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED

TOLERANCES UNLESS OTHERWISE SPECIFIED FRACTIONS DEC ANGLES ± ± ±	ddi DESIGN DEVELOPMENT, INC.		
APPROVALS	DATE	SCHEMATIC DIAGRAM 100R-4 RECEIVER (B)	
DRAWN D&S	11-8-88		
CHECKED		SCALE NONE	SIZE D
ISSUE		DRAWING NO. 30-6740-1009	
		DO NOT SCALE DRAWING	SHEET 8 OF 13


REVISIONS
LTR | DESCRIPTION | DATE | APPROVED
DATA INPUT LOGIC
P15 | P16 | P17 | DATA IN
0 | X | X | NZ
1 | 0 | 0 | N1
1 | 0 | 1 | THL 10 dB
1 | 1 | 0 | THL 1 dB
1 | 1 | 1 | THL .1 dB
NZ - TEST MODE CODING
0000 = LEVEL
0001 = NOISE
0010 = RET/LOSS
0101 = NOISE TO GND
NOTES: UNLESS OTHERWISE SPECIFIED
1 LAST REFERENCE DESIGNATIONS USED: R153, C113, Y2, CR30 P1150I, U49
SERIAL OUT 2 WIRE TO REAR CONNECTOR
TO DISPLAY CKT
ddi DESIGN DEVELOPMENT, INC
SCHEMATIC DIAGRAM
100R-4 DIGITAL CKT.
SCALE NONE
SIZE D
DRAWING NO 80-6740-1009
ISSUE
DO NOT SCALE DRAWING



REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED

TOLERANCES UNLESS OTHERWISE SPECIFIED
FRACTIONS DEC ANGLES
± ± ±

ddi DESIGN DEVELOPMENT, INC.
1440 ATTEBERRY LANE SAN JOSE, CA 95131 (408) 946-8770

APPROVALS	DATE
DRAWN DLS	1-13-86
CHECKED	
ISSUE	

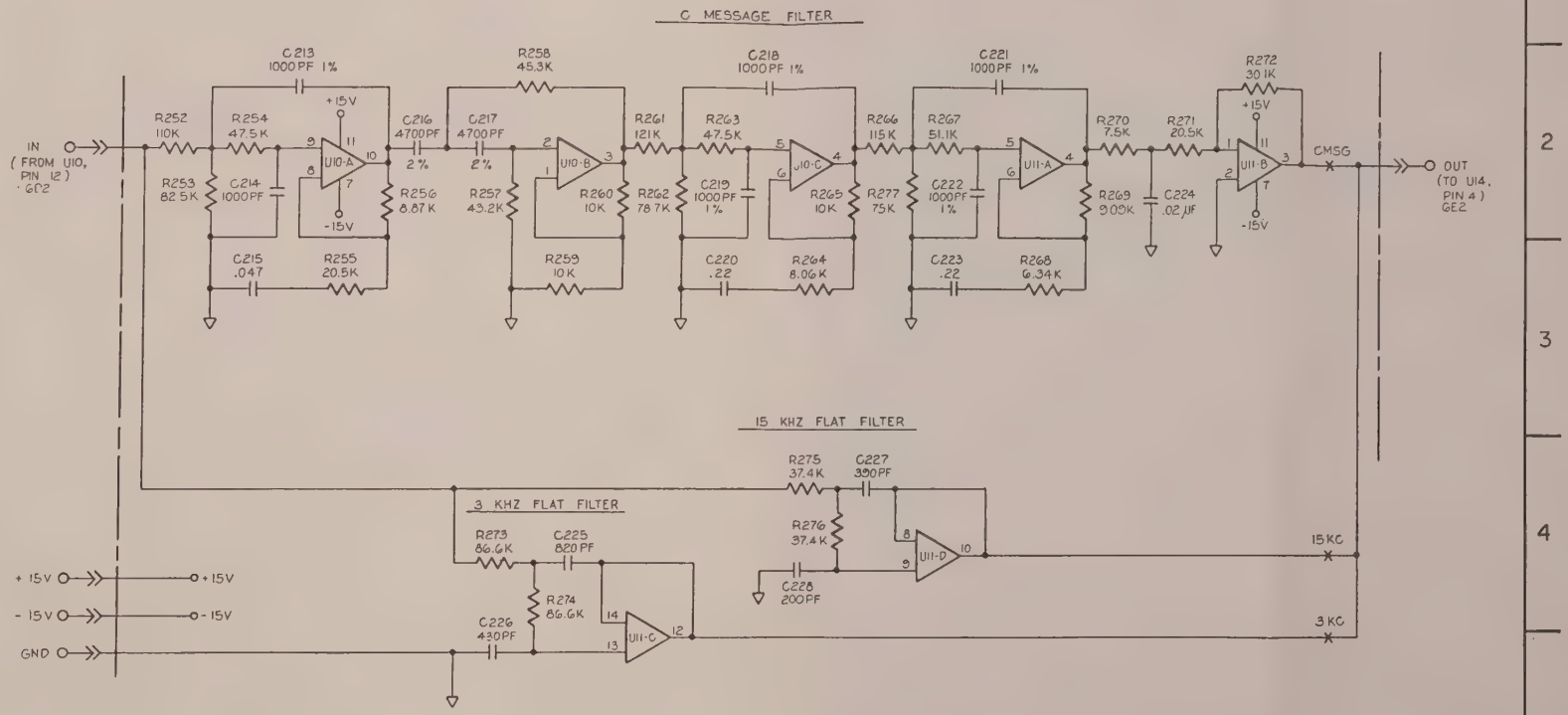
SCHEMATIC DIAGRAM
100R-4 CONTROL LOGIC CKT.

SCALE	SIZE	DRAWING NO
NONE	C	80-6740-1009

DO NOT SCALE DRAWING — SHEET 8 OF 13

BISHOP GRAPHICS, INC. REORDER NO. 70622

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED



NOTES: UNLESS OTHERWISE SPECIFIED.
1. ALL RESISTORS ARE MF. (METAL FILM) 1%.
2 ALL OPERATIONAL AMPLIFIERS ARE SB 4136.

TOLERANCES UNLESS OTHERWISE SPECIFIED		
FRACTIONS	DEC	ANGLES
±	±	±

APPROVALS	DATE
DRAWN DJS	4-18-86
CHECKED	
ISSUE	

ddi DESIGN DEVELOPMENT, INC.
1440 ATTESBURY LANE SAN JOSE, CA 95131 (408) 946-6770

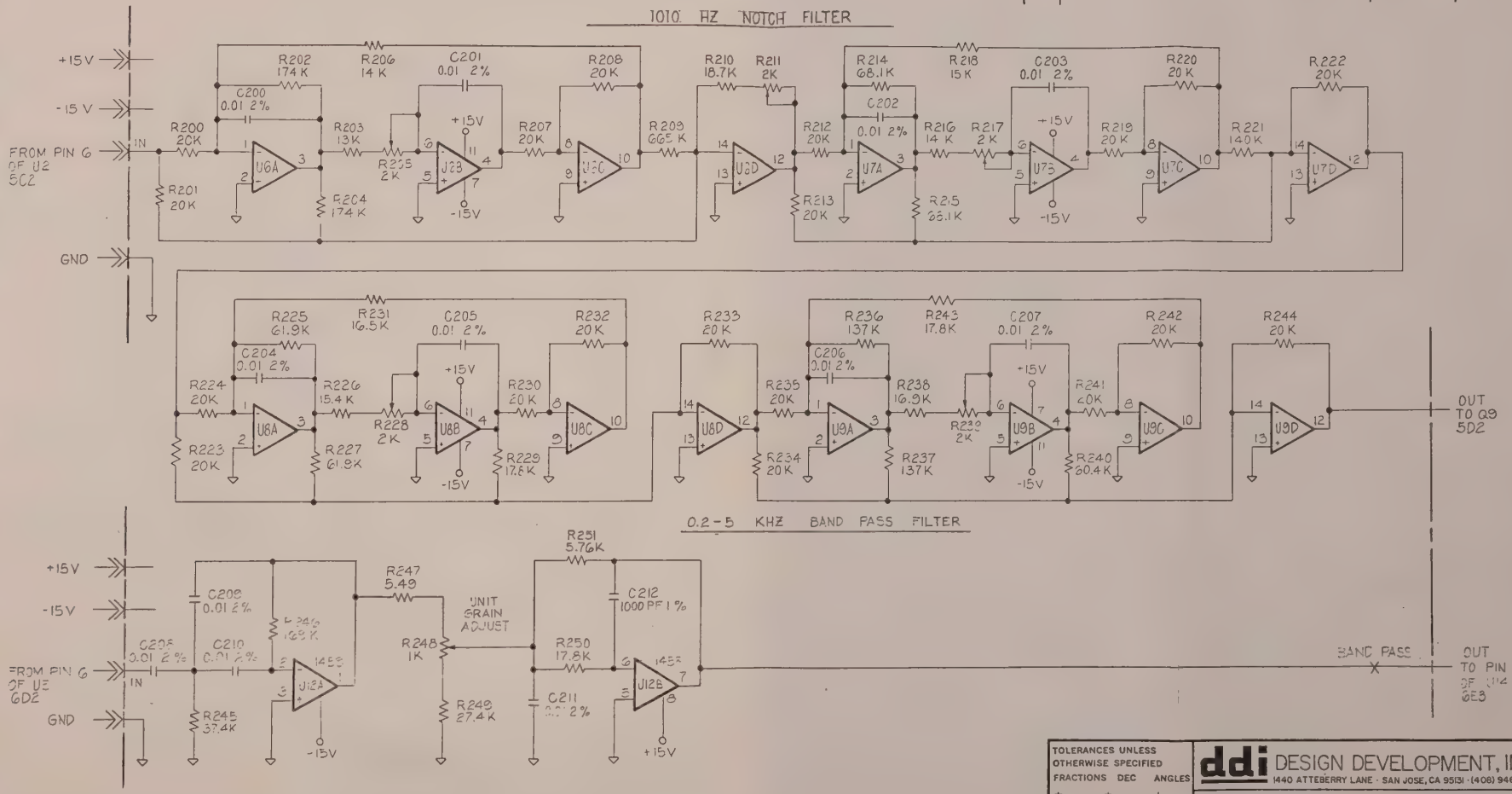
SCHEMATIC DRAWING
100R-4 FILTER CKT.

SCALE	SIZE	DRAWING NO.
NONE	C	80-6740-1009

DO NOT SCALE DRAWING SHEET 9 OF 13

BISHOP GRAPHICS INC. NORTHRIDGE, CA. 91324

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED



NOTES:
1. ALL RESISTORS ARE METAL FILM 1/4 W, 1%
2. ALL OPERATIONAL AMPLIFIERS ARE RC4136 UNLESS OTHERWISE SPECIFIED.
3. U6, U7, U8, AND U9 = UA4136PC.

TOLERANCES UNLESS OTHERWISE SPECIFIED		
FRACTIONS	DEC	ANGLES
±	±	±

APPROVALS	DATE
DRAWN DLS	2-21-86
CHECKED	
ISSUE	

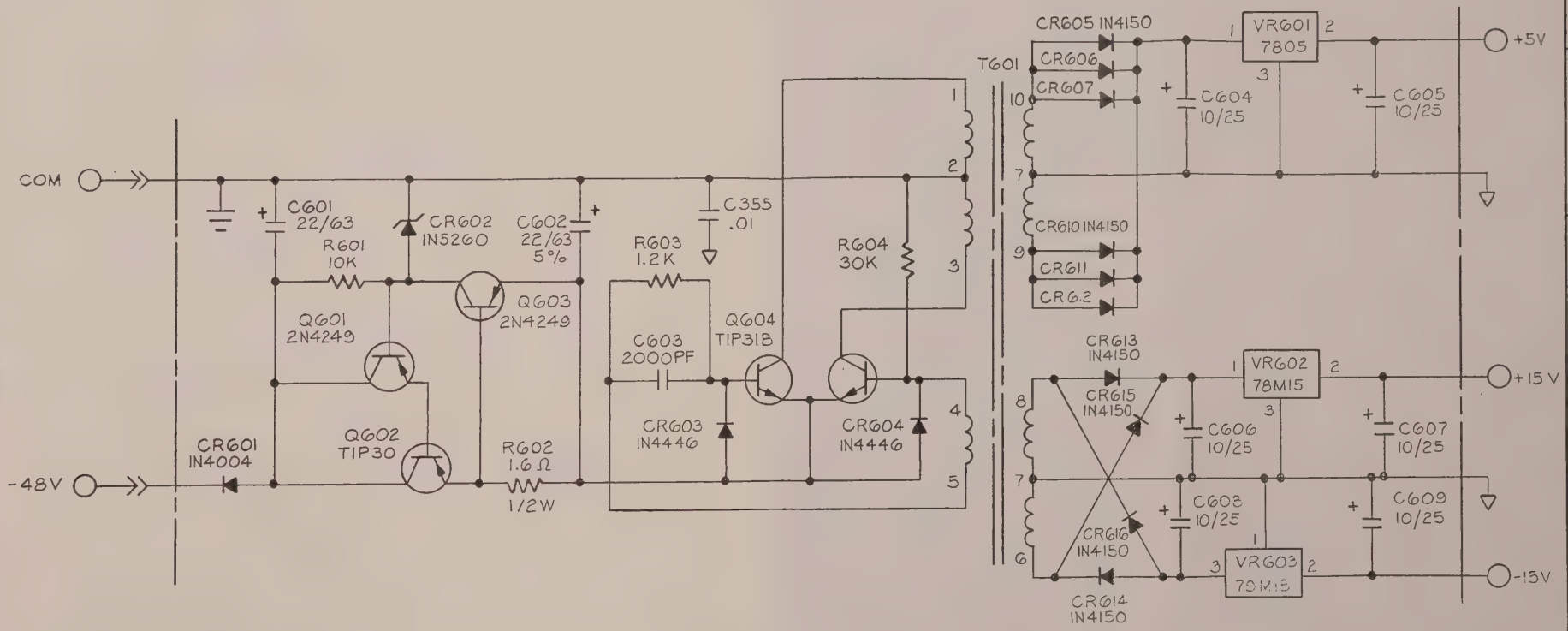
ddi DESIGN DEVELOPMENT, INC.
1440 ATTEBERRY LANE · SAN JOSE, CA 95131 · (408) 946-6770

SCHEMATIC DIAGRAM
100R-4 NOTCH & B.P. FILTER

SCALE	SIZE	DRAWING NO.
NONE	B	80-6740-1009

DO NOT SCALE DRAWING — SHEET 10 OF 13

BISHOP GRAPHICS, INC. REORDER NO. 20621



REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED

TOLERANCES UNLESS OTHERWISE SPECIFIED
FRACTIONS DEC ANGLES
± ± ±

APPROVALS	DATE
DRAWN DLS	11-8-85
CHECKED	
ISSUE	

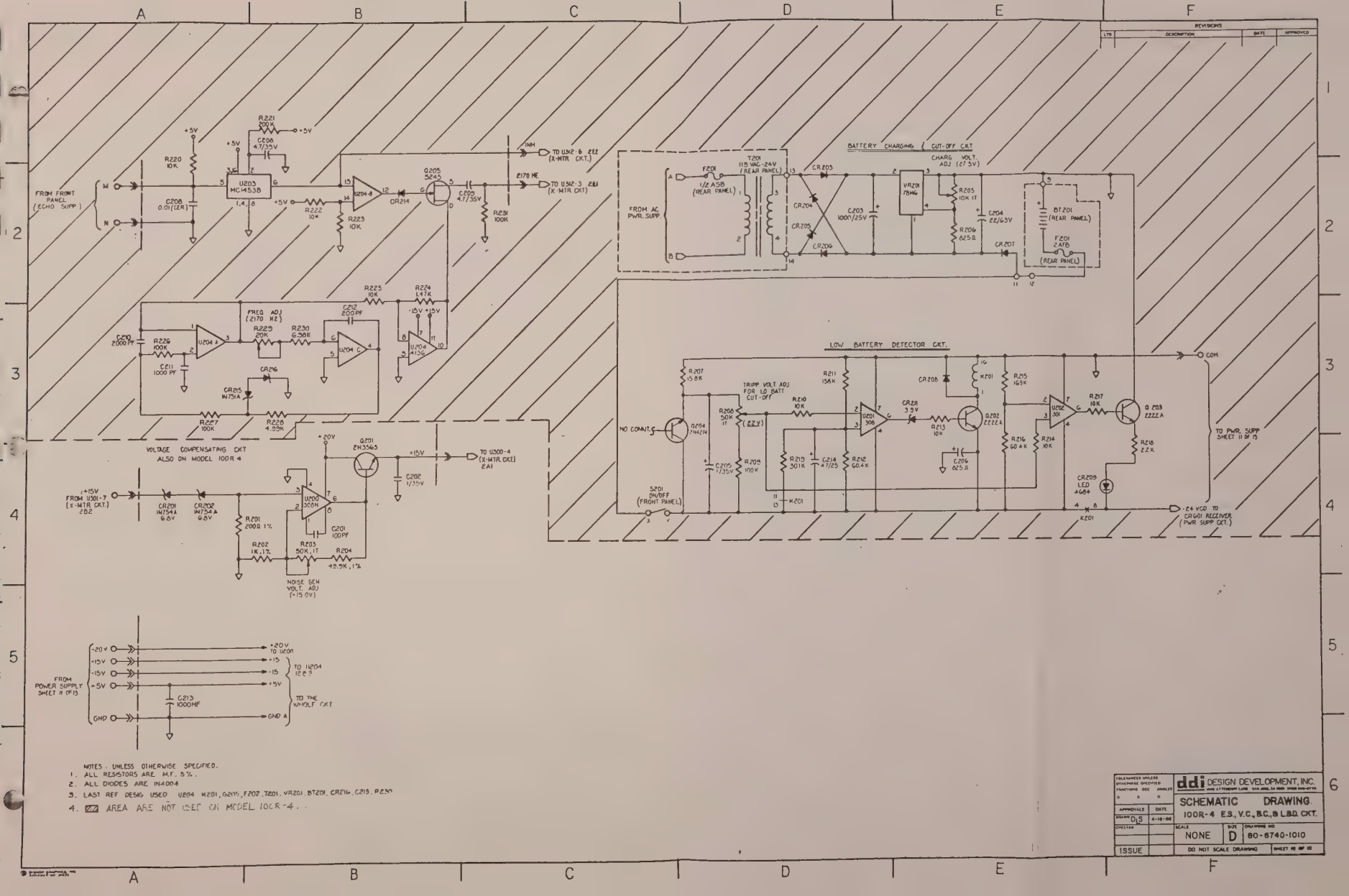
ddi DESIGN DEVELOPMENT, INC.
1440 ATTESERRY LANE · SAN JOSE, CA 95131 · (408) 946-6770

SCHEMATIC DIAGRAM
100R-4 POWER SUPPLY(-48)

SCALE	SIZE	DRAWING NO.
NONE	B	80-6740-1010

DO NOT SCALE DRAWING — SHEET 11 OF 13

BISHOP GRAPHICS, INC. REORDER NO 20521



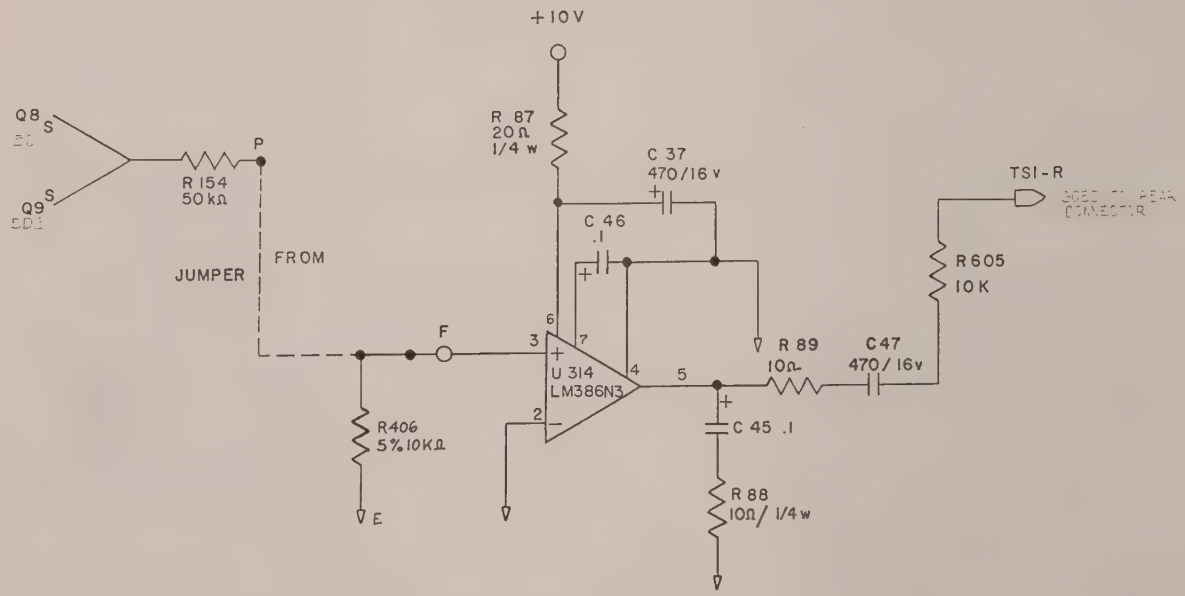
NOTES . UNLESS OTHERWISE SPECIFIED.

1. ALL RESISTORS ARE M.F. 5%.
2. ALL DIODES ARE IN4004
3. LAST REF DESIG USED U204 MZ01, G209, F202, TZ01, VR201, BT201, CR216, C213, R230
4. ZZZ AREA ARE NOT USED ON MODEL 100R-4 .

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED

TOLERANCES UNLESS OTHERWISE SPECIFIED FRACTIONS DEC ANGLES		ddi DESIGN DEVELOPMENT, INC.	
APPROVALS	DATE	SCHEMATIC DRAWING	
DRAWN D.S	4-18-88	100R-4 E.S., V.C., B.C., & L.B.D. CKT.	
CHECKED		SCALE NONE	SIZE D / DRAWING NO 80-8740-1010
ISSUE		DO NOT SCALE DRAWING	SHEET 10 OF 13

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED



USED ON		
MODLE	DWG NO.	ISSUE
100R-4	80-	
100R-6		
ADC 1771		
ADC 1951		

TOLERANCES UNLESS OTHERWISE SPECIFIED		
FRACTIONS	DEC	ANGLES
±	±	±

APPROVALS	DATE
DRAWN DLS	5-7-85
CHECKED	
ISSUE	

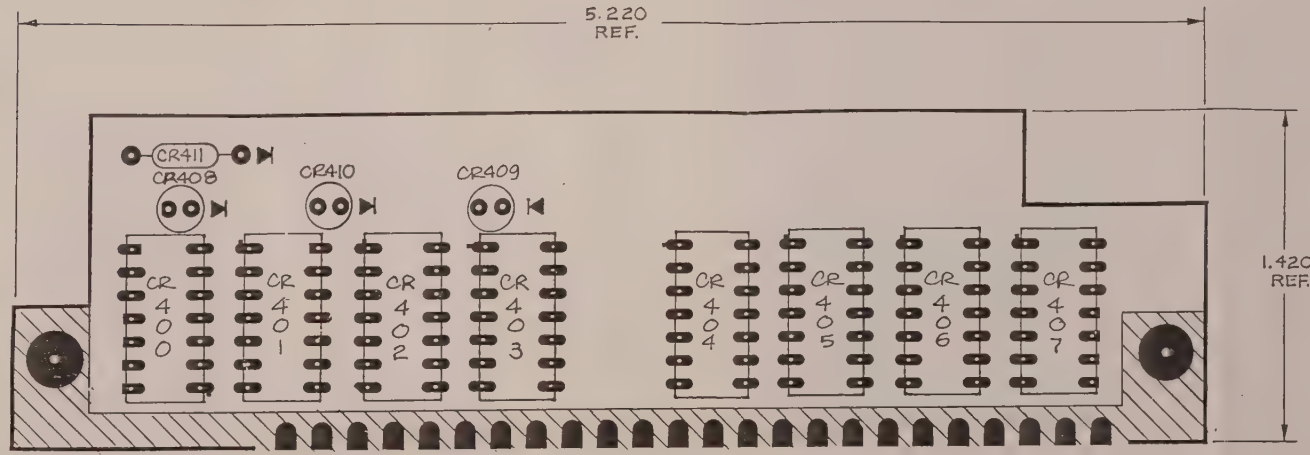
ddi DESIGN DEVELOPMENT, INC.
1440 ATTEBERRY LANE · SAN JOSE, CA 95131 · (408) 946-6770

SCHEMATIC DRAWING
100R-4 AUDIO MONITOR CKT.

SCALE	SIZE	DRAWING NO.
NONE	B	80-6740-1009

DO NOT SCALE DRAWING — SHEET 13 OF 13

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED

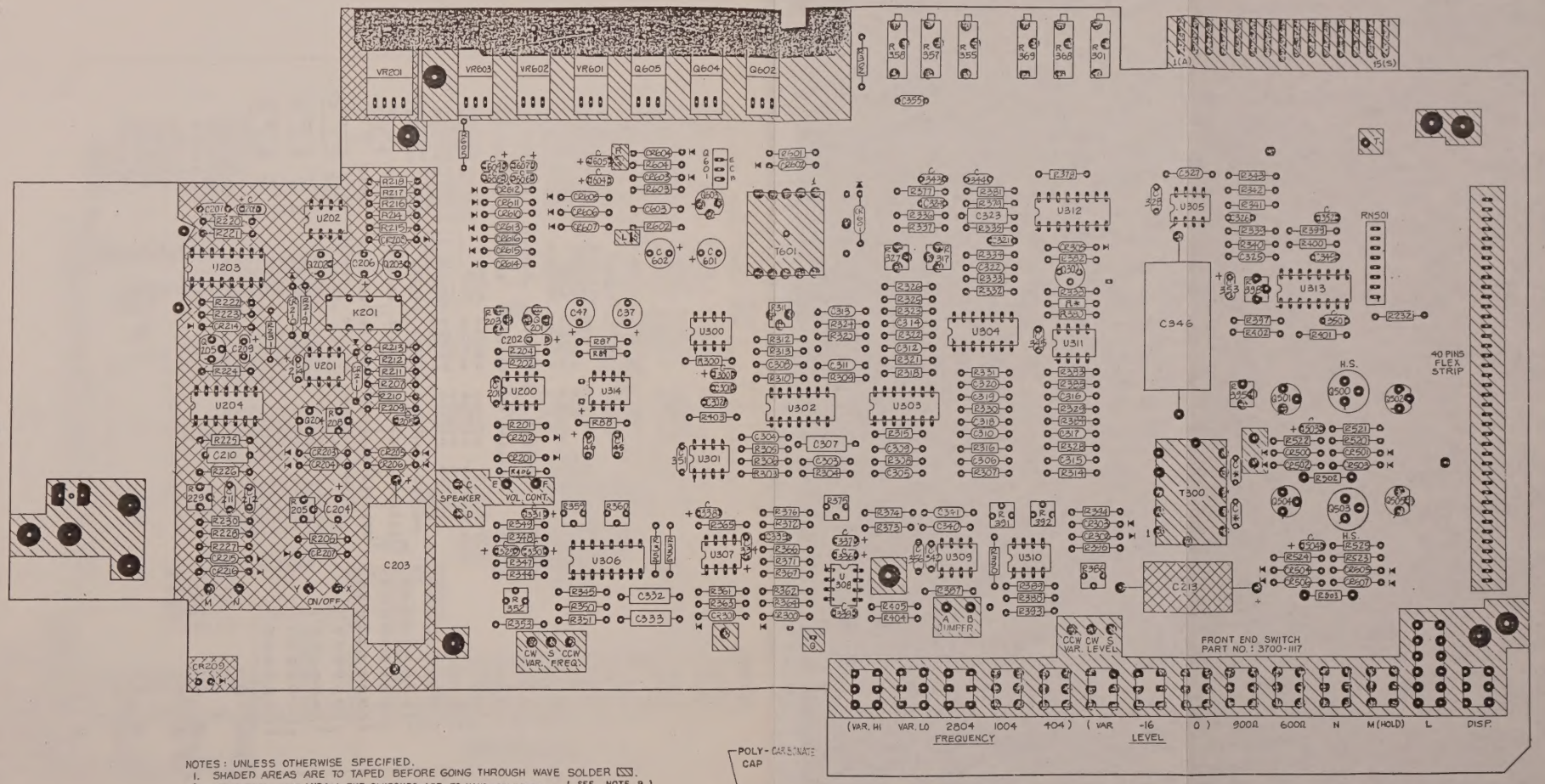


NOTES: UNLESS OTHERWISE SPECIFIED.

1. SHADED AREAS ARE TO TAPED BEFORE GOING THROUGH WAVE SOLDER ▨.
2. MAXIMUM HEIGHT FROM P.C.B.'S SURFACE TO THE TIP OF SMALL L.E.D (CR408, CR409 & CR410) IS 5/8".
3. LARGE L.E.D'S ACTUAL VIEW:
   A. CR400 B. CR401 - CR407

TOLERANCES UNLESS OTHERWISE SPECIFIED FRACTIONS DEC ANGLES ± ± ±	DESIGN DEVELOPMENT INC. SUNNYVALE, CALIFORNIA		
APPROVALS / DATE	LOADING DIAGRAM 100R-4 DISPLAY, ISSUE 6		
DRAWN CP 6/30/83			
CHECKED	SCALE NONE	SIZE B	DRAWING NO. 30-6740-101
	DO NOT SCALE DRAWING		SHEET 1 OF 3

BISHOP GRAPHICS INC
REORDER NO. 20621



NOTES: UNLESS OTHERWISE SPECIFIED.

1. SHADED AREAS ARE TO TAPED BEFORE GOING THROUGH WAVE SOLDER ▨.
2. T300, T601, C603 AND ALL THE SWITCHES ARE TO HAND-SOLDERED. (SEE NOTE 9)
3. USED FAN-TYPE HEAT-SINKS FOR Q500 & Q503.
4. VR201, VR603, VR602, VR601, Q605, Q604 & Q602 ARE TO INSTALLED AFTER GOING THROUGH WAVE SOLDER.
5. CROSSED OUT AREAS ARE NOT TO LOADED ▩.
6. * : OPTIONAL COMPONENT.
7. POLY-CABUNTE CAPS BODIES P/N 1058-0100 SHOULD BE RAISED APPROXIMATELY .12 FROM P.C BOARD.
8. THE FOLLOWING ITEMS SHOULD NOT BE PUT THRU THE WASH CYCLE..... (REF TO NOTE 2)
   THESE ITEMS MUST BE CLEANED BY HAND WITH BRUSH.

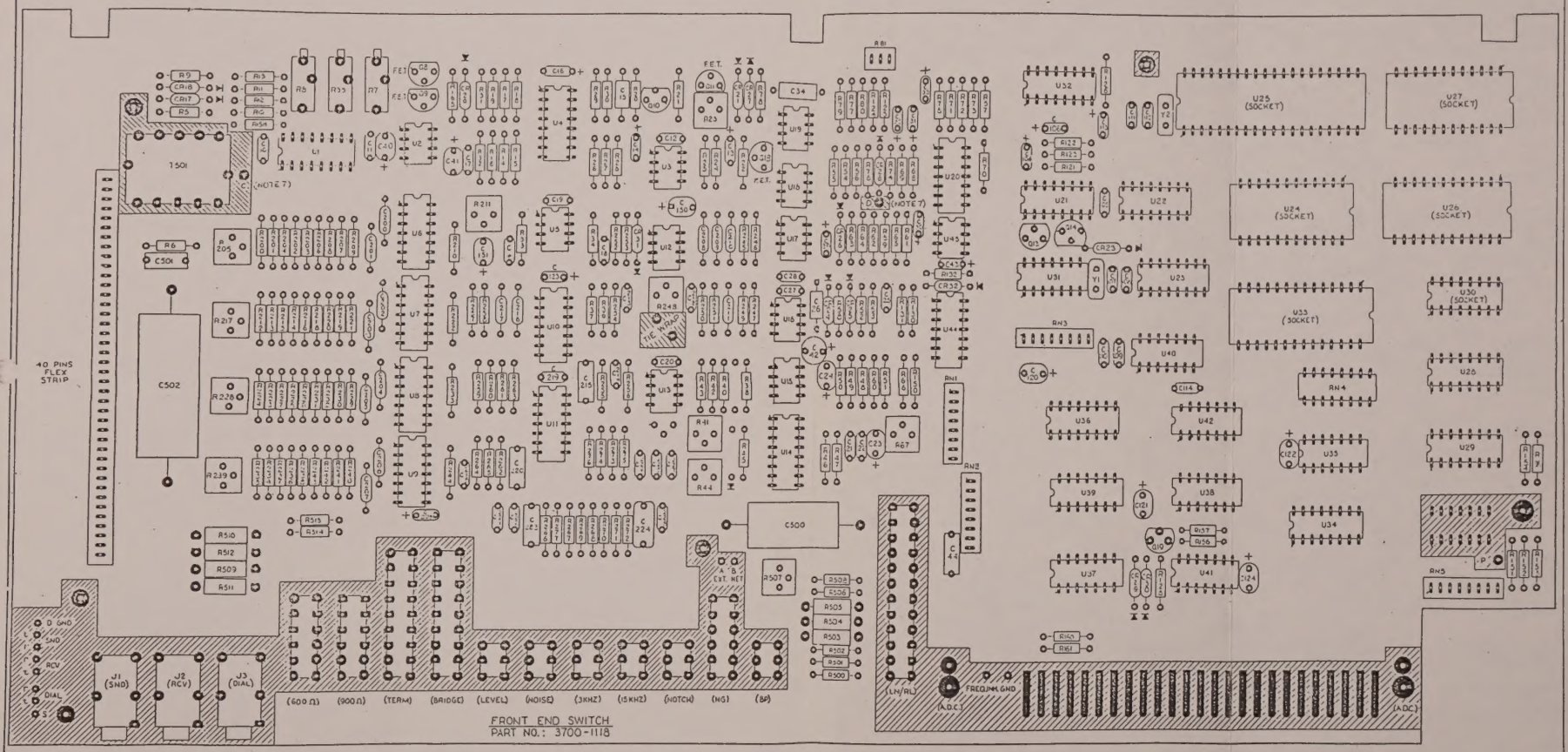
REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED

ddi DESIGN DEVELOPMENT, INC.

LOADING DIAGRAM
100R-4 TRANSMITTER

APPROVALS	DATE
DRAWN C.P.	
CHECKED	
SCALE NONE	SIZE D
DRAWING NO. 30-6740-100	
ISSUE 3	DO NOT SCALE DRAWING
SHEET 2 OF 3	

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
10	REVISED	3-11-85	DLS



NOTES : UNLESS OTHERWISE SPECIFIED.

1. REFERENCE P/N :
   A_ SCHEMATIC ; 80-6740-1009, ALL SHEETS.
   B_ PARTS LIST: 33-6740-1009, ALL SHEETS.
2. MAXIMUM COMPONENT HEIGHT .75 .
3. OPTIONAL COMPONENTS ARE MARKED WITH ASTERISKS (*).
4. CLIP ALL PIN FLUSHES (INCLUDING ICS') AT SOLDER JOINTS.
5. TAPE ALL SHADED AREAS (ZZZ) BEFORE WAVE SOLDERING.
6. HAND-SOLDER T501, J1, J2, J3, AND ALL SWITCHES ON COMPONENT SIDE. (SEE NOTE 9)
7. CONNECT PIN "C" TO PIN "D" USING THE GREEN JUMPER CABLE.
8. REFERENCE P.C. BOARD SIZE 7.59 X 16.62 .
9. THE FOLLOWING ITEMS SHOULD NOT BE PUT THRU THE WASH CYCLE..... THESE ITEMS MUST BE CLEANED BY HAND WITH BRUSH .
10. TAPE THE PADS OF C500 AND R507 BEFORE WAVE SOLDERING.

TOLERANCES UNLESS OTHERWISE SPECIFIED: FRACTIONS DEC ANGLES X ± .1 .XX ± .01 .XXX ± .005	ddi DESIGN DEVELOPMENT, INC. 10140 ALTEMESA DR. SAN DIEGO, CA 92126 (619) 578-3900
APPROVALS DATE	LOADING DIAGRAM 100R-4 MAIN
DRAWN PH. 7/25/84	
CHECKED MTP 8/1/84	SCALE NONE SIZE D DRAWING NO 30-6740-1009
ISSUE 12	DO NOT SCALE DRAWING SHEET 3 OF 3

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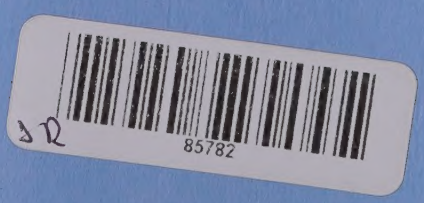
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